Agroecology and the Future of Food Sovereignty

A conversation with Miguel Altieri and Richa Kumar

Miguel Altieri* and Richa Kumar†

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Abstract: *For more than four decades, agronomist Miguel Altieri has been one of the world's leading voices on agroecology. His scholarship has helped define agroecology as both a scientific field and a political project grounded in ecological principles, biodiversity, and the sovereignty of smallholder farmers. He has written numerous books, including* Agroecology: The Science of Sustainable Agriculture *(1995), which defined the field. He has worked closely with* campesino *movements across Latin America to advance forms of agricultural development shaped from below. Joining him is Richa Kumar, an analyst of agrarian change in contemporary India. Her ethnographic work shows how technological and economic transformations reshape rural livelihoods, nutrition, knowledge, and ecological relations. Agroecology has become central to imagining rural futures beyond the extractive logics of industrial agriculture. Altieri and Kumar's work affirms an approach that refuses to separate food, culture, ecology, and social justice, while recognizing the challenges of labor, knowledge, caste, and aspiration that accompany any move away from monoculture. This conversation ranges from the politics of university research and the hierarchies embedded in "traditional" knowledge, to the social forces that reproduce monocultures, to the spiritual resources many farmers draw upon as they reimagine humanity's relationship to land. Together, they broaden how we understand rural places structured around alternative agricultural systems that foster autonomy, solidarity, and ecological resilience.*

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Kerilyn Schewel: Our conversation today is part of two overlapping speaker series exploring alternative visions of rural transformation—those that challenge mainstream models of capitalist, industrial development and hold the potential to enhance the livelihoods and future prospects of rural communities. In our search for these alternatives, the prevalence and possibilities of agroecological movements around the world stand out.[1]

Agroecology is an approach to agricultural change that recognizes it is no longer possible to look at food, livelihoods, health, culture, and the management of natural resources separately. It embraces systems thinking and holistic approaches to address the complex and interdependent challenges that rural communities face. Of particular interest in light of this conversation, agroecology both draws upon and generates local knowledge for rural transformation.

Daniel Duhart: Miguel, how do you define agroecology? And what led you to focus your research and career on the science of sustainable agriculture?

Miguel Altieri: Agriculture is basically the artificialization of nature by modifying ecosystems and transforming them into the monoculture systems that dominate the landscapes of the world. Globally, we have 1.5 billion hectares (3.7 billion acres) of agriculture. Eighty percent are monocultures dominated by three crops: maize (corn), wheat, and rice. So agriculture has led to an extreme simplification of ecosystems.

In contrast, agroecology tries to design and regenerate agricultural systems based on ecological principles. The idea is to develop systems that are resilient, that are based on biodiversity and local knowledge, and that promote food sovereignty—a socially just and culturally diverse agriculture as well as one that is economically viable. Agroecology breaks the nature of monoculture systems by incorporating practices that have been used by small farmers for centuries, like intercropping and agroforestry systems, livestock integration, and soil organic management techniques.

At the same time, agroecology is a transformative science. It challenges the power structures that dominate the food system and tries to create a much more localized food system based on solidarity between producers and consumers, leading to local food systems that provide food sovereignty for everybody.

What led me to agroecology? I was trained as an agronomist in Chile, based on the teachings of the Green Revolution, which in Latin America were distributed by US universities after the

[1] This conversation is part of the 2023 COMIT speaker series, Rural Transformations, moderated by Daniel Duhart and Kerilyn Schewel. See https://www.comitresearch.org/rural-transformations. The conversation that follows has been edited and condensed for clarity and publication.

Cuban Revolution.[2] Chilean researchers were trained at the University of California. More than 150 professors from Chilean universities went to the US to study with scholarships from the Ford Foundation. They came back to Chile and replicated the California model. I did not learn about the small-scale farming that was dominant in the country at that time.

After the military coup in 1973, I left Chile and ended up in Colombia where, for the first time, I was exposed to small farmers who used intercropping—something that was absent from my formal education. I immediately saw that there were deficiencies in my technical formation that did not allow me to understand the complexity of traditional farms in developing countries. I quickly realized that I needed ecological understanding in addition to my standard agronomy education.

After this, I moved to the US—where I was trained in entomology as a PhD at the University of Florida—and I was lucky to end up in Berkeley as a young professor joining a group of entomologists that were researching the biological control of pests using alternatives to pesticides that had been in wide use since the late 1800s. I realized that the pests themselves are not the problem, but the way we farm. Insects are opportunistic organisms that, when conditions favor them, will see their populations explode. So I quickly understood that the problem was the monoculture system that lacks ecological regulation mechanisms.

The monoculture system deprives the landscape of natural enemies and other conditions for biological control. It needed to be changed into more diversified farming systems that provide opportunities for biodiversity and ecological functioning. But it was also very quickly obvious to me that the dominant capitalist agricultural system—itself dominated by corporations that were funding the university—was not going to be open to the idea of developing an autonomous agriculture that didn't use pesticides. And so, it struck me that science was also political in many ways. That's how I started to understand that promoting agroecology was going to be an uphill battle.

Daniel: Richa, as a social anthropologist, your work is centered on understanding the structural factors that shape the livelihoods of India's farmers. What life experiences drew you to this sustained focus on rural communities?

Richa Kumar: A couple of decades ago, I got into the rural space somewhat by accident. This was during the dot-com bubble and bust around the year 2000, and I was part of a group trying to use computers to transform rural lives. This was when you had big computer monitors and

[2] The Green Revolution was a mid-twentieth-century effort to rapidly increase global food production through high-yield crop varieties, chemical fertilizers, pesticides, and irrigation. It dramatically boosted harvests but also created long-term environmental and social challenges.

not the kind of internet you see today. As we took these machines to villages in India, I realized that, while technology may have had a role to play, one needed to understand rural life and agrarian systems far better to see what technology could actually do in these spaces.

I ended up doing a PhD, trying to understand the relationship between technology, agriculture, and broader social transformations. In central India, I ended up studying soybean monocultures. Soybeans are one of those big crops that Professor Altieri speaks about—feeding cattle and then feeding the global nutrition transition toward more meat eating.

As a social anthropologist, I stayed in a village in central India for an extended period, spending time with farmers, farm laborers, traders, and processing companies across the soybean supply chain. I could see in practice the implications of monoculture farming for all these different actors in the system.

Two large takeaways stayed with me. One was the drastic implications of pesticides—the toxicity not only for human beings but also for the soil and the ecosystem. At this point, I wasn't familiar with agroecology; I was just coming from the field, working with farm laborers and farmers who'd been spraying. You could just feel and see the impacts.

The other big concern was nutrition. As diversity disappeared from the farms, it also disappeared from diets. When I spoke to elderly people in these villages, they spoke about a whole vast range of foods they used to eat. And now it was just rice, wheat, sugar, tea, and ultra-processed foods.

I decided to work toward understanding this relationship between agriculture, health, and the environment in more detail. And that led me to agroecology and Professor Altieri's work. Over the last decade, much of my work has documented the problems of monoculture farming. But, in the last few years, I've also tried working with institutions and organizations to research alternative practices and see how they can be made a reality on the ground. The challenges are enormous, but it's good to see that the seeds of these alternatives have been sown in many parts of India. While the road ahead is challenging, I see a lot of hope.

Kerilyn: Let's turn to the question of local knowledge. Miguel, as you've mentioned, agroecology is knowledge-intensive and highly sensitive to the local context. In your opinion, what counts as local knowledge, how do agroecological approaches draw upon it, and how does this form of knowledge generation differ from so-called "modern" agriculture?

Miguel: Studying traditional systems has been key for the development of agroecology. In Latin America, Asia, and Africa, there are complex farming systems based on the people's deep knowledge of the environment, each of which has its own classification systems—of plants, soils, and animals, as well as how to use them. As agroecologists, we have studied and derived lessons

from these people about how these systems have been able to withstand climate change for centuries and how they have adapted to harsh conditions to produce food without the inputs of modern science. Microcosms of traditional agriculture still exist and are very resilient and sustainable, and they are actually able to successfully feed local populations.

So, traditional knowledge for us is a complex of culturally-determined knowledge and practices that have been passed from generation to generation, from farmer families to farmer families. That's why we say that agroecology is a science based on a *dialogue of wisdoms*. On one side, you have the contributions of modern agricultural science, ecology, and social sciences, but, on the other side, you also have traditional knowledge.

From this dialogue emerges a set of principles. Agroecology is not a set of practices or recommendations; it's a set of principles that guide the design and management of the new agricultural systems that we need in order to confront the global crisis that humanity is facing.

And how do we work with this traditonal knowledge? First of all, we don't intend to validate it. For example, if you go to the Andes and ask a farmer, "Is this soil good?," the farmer will taste the soil. Obviously, if you have a PhD in soil science, you're going to react saying, "What is this? I was never taught at the University of California that you could classify soils based on taste or sound." But, if those people have managed those systems for centuries based on those taxonomies, then I'm not going to question that.

The idea is to integrate that knowledge with the modern knowledge that we have through participatory approaches. Our role is not to impose ideas, but to facilitate an exchange of ideas and practices and develop methodologies that elicit curiosity and observation by farmers so that they can come up with their own solutions. It's a transdisciplinary approach that is respectful of local knowledge and enriching for both sides.

Kerilyn: Building on this—Richa, you also bring a critical eye to alternatives that prioritize so-called "traditional" knowledge. Based on what you're seeing in India, what concerns do you have about this growing interest?

Richa: I'll respond with two examples. The first is about gender, and the second is about caste. This year [2023] is the International Year of Millets. There is a lot of interest now, especially in India, in promoting various kinds of millets, both on farms and in terms of consumption. Now, the thing about millets is that processing them is very tedious. The kinds of technologies that we have to process rice and wheat cannot be used in the same way with millets. You require different kinds of processing, especially if you want to retain the nutritive value of the grain by not completely removing the outer bran.

Historically, the labor required to remove this bran was done by women. It was entirely gendered labor. A lot of this call for going back toward tradition does not actually recognize this historically inequitable form of labor that was integral to making millets available. Millets are now being rehabilitated and called *Shri-anna*, or "God's food," but these traditional, hierarchy-laden power relationships also need to be examined.

There is also a link between millets and caste. Several millet grains in the past have been denigrated as food for animals or for underprivileged caste groups, while the elite ate white polished rice and wheat. A lot of the resistance toward millets has to do with this historical association. The aspirations of a large majority of consumers are to eat the foods of the rich. It is to eat that white bread or, nowadays, to eat noodles, momos, pizza, and burgers. Recognizing these caste and gender linkages is very important as we try to rehabilitate traditional practices. We need to reimagine and recreate practices that are socially just and that incorporate the empowerment of marginalized groups.

Additionally, India has a rich traditional heritage of water harvesting systems. Across the country's diverse agroecological zones, local technologies were developed to harvest and store monsoon water for long periods. That knowledge is very critical, and we need to bring that back on board. Yet, if we go back historically to understand how those systems were built and maintained, it's very clear that specific caste groups were tasked with the job. This was their occupational specialization. But, in many cases, they did not have the right to own land or use resources from these systems for their own sustenance. They were part of these very unequal power relationships.

So I completely agree: there are important parts of traditional knowledge we must recover, but we must also recognize those hierarchies and inequalities of the past and make efforts to address them as we bring the traditions on board today.

Daniel: It's common to encounter a dichotomy between local and global knowledge or between the traditional and the scientific. Can these dichotomies be addressed, or even transcended?

Richa: I think there is a role for multiple forms of knowledge. I would include within "knowledge" the idea of "practice." Knowledge ultimately is an integration of both action and theory. I also think the terms "local" and "global" are preferable to "traditional" and "scientific."

If we think about climate change, it's essential to have global-level data from satellites and sensors. And yet, at the same time, it's very important to understand local factors. We may agree that afforestation is a great principle, but what kinds of trees do we want to plant in a particular region? What would be their use? Would they be providing fruit, shade, or windbreaks? And

most importantly: who gets to decide which purposes are desired, and then who gets to own, maintain, and work with those trees in the long run?

The standardized industrial solutions that we have deployed so far have tried to homogenize everything, making us run a race against nature. Whether it's pesticide resistance or herbicide resistance, the industrial solution keeps trying to run further ahead. At some point, we have to become humble, drop our arrogance as human beings, and challenge the scientific hubris that insists we can know everything about the world. We need to accept that there are multiple forms of knowledge and practice available, and we all need to work together to make our lives livable again.

Miguel: I agree with many things Richa said, but I would like to take another angle. The hegemonic science that predominates in universities has developed an agriculture that is already in trouble, whereas traditional farming systems have stood the test of time.

The idea of dominating nature comes from influences that started with Descartes, who taught that you must understand a system by its parts. That's how modern science became atomistic, with everybody specialized but lacking a holistic perspective. Then came Darwin, who was misinterpreted as emphasizing the "survival of the fittest" and competition, which overshadowed the fact that, in nature, there's more cooperation than competition between organisms. Then comes Malthus saying that hunger is because populations are reproducing exponentially and food production is lagging behind and that, therefore, we need technology to close the gap. The Green Revolution took advantage of that way of thinking. And then comes von Liebig and the "law of the limiting factor," which teaches that, if you have a nitrogen deficiency, you add nitrogen; if you have a pest, you apply a pesticide—without understanding that these problems are just symptoms of an ecological imbalance. You need to use ecological principles to bring the system back into balance, not inputs.

So, here we are. We have an agriculture that is totally dependent on petroleum, that is causing more than one-fourth of greenhouse emissions yet is vulnerable to climate change, and that is causing massive biodiversity loss through deforestation and pesticide loads. And, on top of that, we have millions of people hungry and food insecure. Modern Western science failed the resiliency test, and therefore we need a new paradigm, which is agroecology, the only viable way to provision food in a planet in crisis.

At the beginning, we were just a few people, treated as communists and hippies. They ignored us, saying we were anti-science. Then after agroecology continued growing as a social movement—without support from governments, universities, or foundations—they started attacking us, saying, "Well, you cannot feed the world with agroecology." And now, big

organizations like the Food and Agriculture Organization (FAO), other UN agencies, and the universities that fought against us are embracing the term. But theirs is an agroecology that leaves out the political and social dimensions, a junk agroecology.

Kerilyn: You're both academics in university settings. What kind of changes need to happen within the university, in terms of pedagogy or research, to realize a greater complementarity between these forms of knowledge?

Miguel: I think universities are totally divorced from reality. At the Berkeley campus—where we have the Berkeley Food Institute that talks about food sovereignty—we're surrounded by homeless, poor, hungry people. If we are not able to solve the local problem in our community, that says a lot about what the university can do for the world.

I see highly intelligent researchers producing a lot of papers, but they are caught in the academic race of publication, meta-analysis, and sophisticated papers because that's the incentive for promotion. I don't see the university responding to the needs of the people in a way where science is seen as having a social function to solve the pressing problems of the most vulnerable people.

I think the land-grant university betrayed its mission. The research agenda is increasingly determined by corporate funding because public universities are receiving less and less support from the state and from the public sector. So the main strategies that universities are embracing are biotechnology, digital agriculture, robotics, and artificial intelligence. I don't see local knowledge coming in to influence the research agenda. Because universities don't respond to the needs of small farmers, *La Via Campesina*[3]—the largest peasant movement in the world—created its own university system in Latin America, the Latin American Agroecology Institutes, using their own methodologies and pedagogies so that what students learn can be applied in their local communities.

Richa: I want to emphasize the question of research funding. In India, it's the American land-grant university model that was propagated as part of the Green Revolution. This led to two important shifts. We moved from several regional agricultural institutes studying regional problems across multiple crops to a very centralized research agenda set in New Delhi—but effectively set by the US. Very few select crops received the bulk of the funding in the name of agricultural modernization and food security. We are seeing the consequences today. We are a huge exporter of rice and wheat and sugar, but we've been importing pulses and oilseeds, which

[3] *La Vía Campesina* is a global grassroots movement of peasants and other small-scale food producers that defends peasant agriculture and its access to land, seeds, and water, and promotes food sovereignty, while resisting corporate-driven industrial agriculture.

are such an important part of our diet, even though India was historically the largest producer of these crops.

The scientific hubris of the "modern" world has to be broken. The legacy goes back to the colonial era, where this logic of "improvement" that was imposed on colonial populations under the assumption that the land and the people were unproductive was a racialized lens that ignored local knowledge. It was strengthened after independence with the coming of the Green Revolution, with the privileging of the expert from outside. Even if the scientist has never stepped into the field, the scientist is still the privileged expert. This is linked to education, caste, class, and gender—all the dynamics that create this hierarchy of the expert above and the farmers down below, who are supposed to be ignorant and backward. That power hierarchy needs to be challenged, because only then will we be able to take local knowledge seriously.

Kerilyn: Richa, it'd be wonderful to hear more about what you're seeing in India. Can you share the main challenges farmers face there?

Richa: Many readers may remember the huge farm protests in 2020 and 2021. They made global headlines for months and were a clear sign of the deep distress across rural India. People sometimes called them the "tractor protests," a bit sarcastically, because so many farmers came on tractors. The assumption was that, if you own a tractor, you must be well-off—so what is there to complain about? Many of these farmers were, and still are, recipients of substantial government subsidies.

So why were they surrounding Delhi demanding change? At the heart of it, the protests revealed the problems of monoculture farming. Farmers are locked into growing single crops, stuck on a technological treadmill with rising input costs, unreliable output markets, and heavy debt. Punjab, where many of the protesters came from, has some of the highest rates of indebtedness and farmer suicides in the country.

It's clear that monoculture farming survives only because of heavy state support. Fertilizers are subsidized; crops like rice, wheat, and sugarcane are procured at minimum support prices. This has pushed farmers to grow them even in places like Punjab, where rice is completely unsuited to the ecology. It's also tied to Delhi's air pollution crisis, since stubble burning from rice farming is one of the major causes.

On top of all of this, farmers face falling groundwater tables, soil toxicity, declining fertility, and climate change. Season after season, heat waves, untimely rains, and pest outbreaks have battered crops. Both the land and the farmers are at a breaking point. Yet change is hard because the entire system—government policy, agricultural research, new technologies, etc.—keeps

reinforcing monocultures. Gene editing, drones, sensors, digital agriculture—none of it is being used to imagine polycultures, intercropping, or agroforestry. That vision simply isn't there.

Over the last thirty-to-forty years, meanwhile, India has seen a budding organic farming movement. Many involved are urban returnees or farmers with the material means to experiment. Some turned to alternatives out of necessity—health crises, failing farms, etc.—but most come from privileged backgrounds that gave them the resources to make the transition. And it isn't "zero budget" farming, whatever the name suggests.[4] Seeds, organic matter, biomass—all require investment, and decades of deforestation and burning have made many of these resources scarce. Organic food has been marketed as an elite product, expensive and accessible mainly to the wealthy. The result is a movement whereby semi-elite farmers sell mostly to elite consumers, sometimes through local markets, sometimes through companies entering the space.

But, for most farmers, livelihoods remain the central concern. Until state subsidies shift away from monocultures toward alternative systems, most farmers will remain locked into the only model the system supports. So, when we think about alternatives, there are four important challenges.

The first is *inputs*. Getting an adequate amount of biomass—animal dung or some other organic material—to revive soils with very low carbon content is a huge effort. There are innovative bio-inputs that are being used across India, but making them is labor-intensive. It's not as simple as buying a bag of urea and putting it on the field. Getting traditional seed varieties has also become a challenge because we have lost so much of that biodiversity in the last forty-to-fifty years. Even if farmers are committed, getting access to all of these inputs at the right time becomes a challenge.

The second is *labor*. The monoculture model has been about mechanization. People often say that now all you need is a tractor: a few days of work at the start of the season, a few in the middle, a few at the end—and you're done. But agroecology and natural farming can't work that way. They require far more labor. And this is where some of the social challenges come to the fore.

[4] Zero Budget Natural Farming (ZBNF) is both a set of farming methods and a grassroots farmers' movement that has spread to various states in India. Coined by Indian agriculturist and author, Subhash Palekar, ZBNF aims to eliminate the need for external, purchased inputs like chemical fertilizers and pesticides by using on-farm, local resources to increase soil fertility and crop productivity.

Farmers say labor isn't available or that it's too expensive. At the same time, India faces huge unemployment, with waves of distress migration to cities.

So there's a deeper cultural problem here, partly linked to caste and aspiration. Working on the farm—working with your hands, with animals—is now seen as demeaning. It's not the kind of work young people want to do. There's a saying from the past twenty-to-thirty years: nobody wants to marry their daughter to a farmer.

Of course, that's gendered—many farmers today are women—but the logic is the same. Parents don't want their daughters handling cow dung or working in the fields. Young men, for their part, want jobs in malls as security guards, or in call centers if they're educated enough. People's aspirations now lie in this urban or peri-urban economy.

That means the labor challenge isn't just economic or technical. It's social and cultural. It raises questions about what kind of work we value. Bharat Bhushan Tyagi, a philosopher-farmer with whom I have written about the challenges of agroecological transitions, talks about how labor shapes health and dignity. Every day, he says, your body wakes up with a certain capacity for physical work. When you labor, you use it up. At night, you rest; in the morning, you start again. If you don't labor—if you ride the elevator, sit on the couch, enjoy every modern convenience—you lose health.

Yet for many people, those modern conveniences define what it means to be developed and privileged. Everyone aspires to that life, even if it distances us from the labor that sustains us.

The third challenge is *markets and nutrition*. The monoculture model is about long supply chains feeding urban markets, which cause climate emissions during transportation, also known as food miles. Long supply chains require producing standardized foods and processing them to ensure a longer shelf life. Processed foods are aspirational but, unfortunately, devoid of nutrients. Often, the effort to create markets for agroecological produce replicates these climate and nutrition concerns—as seen in millet processing in India today, where the nutritive bran is being stripped away to reduce rancidity and promote shelf life. The challenge is how to revive farmers' livelihoods while helping them eat their own nutritious food (and not send all of it to urban centers). How do they feed people in their own vicinity instead of trying to jump on these long supply chains? How can we create diverse, regional supply chains where a farmer growing small quantities of many things can actually find a market?

And last, the most important bit is *knowledge*. To transition, given climate change and the degradation of the local environment, even traditional knowledge is no longer sufficient. Many young people have forgotten it, but, even if they remember, things are so uncertain and

complicated that what worked fifty years ago doesn't seem to be working anymore. We need a way of bringing innovative research back to the farm that brings together scientists, practitioners, and farmers themselves to figure out what local models are possible today.

Miguel: In Latin America, we have a very similar situation with the advance of agribusiness. But we have something that perhaps is not happening in the rest of the world: very strong rural peasant movements, like *La Via Campesina* and the Landless Workers Movement (MST) in Brazil, that are resisting the hegemonic model and promoting alternatives.

They are creating what we call "lighthouses"—spaces of hope wherein agroecology can crystallize at the local level. And there's a whole pedagogic movement called *campesino a campesino* (farmer to farmer), which is a horizontal way of transmitting information and practices between farming communities. This political movement has put pressure on the governments, which led some countries like Brazil to promulgate a national law of agroecology. That law, which was stagnant during Bolsonaro but is alive again with Lula, has very interesting programs. For example, they implemented a school lunch program, whereby municipalities buy thirty percent of their food from local farmers to feed children healthy food. This secures farmers a local market, making them less dependent on markets that are biased against them and that they cannot control.

There are many initiatives whereby consumers and producers are getting together and in which the market economy gives way to what is called a solidarity economy, where there are still money transactions but also solidarity relationships between the peasants and the consumers, who are also poor people. It's a way of democratizing the food system so that agroecologically produced food is within the reach of everybody, not just the elite.

I don't think we can find the solutions to the agricultural and ecological crises in the toolbox of capitalism, because that's what created the problems. As Einstein said, you cannot find the solutions with the same mentality that created the problems. So that's where agroecology comes in. What humanity is facing now is a choice between projects that promote life and projects that promote death, and agroecology is definitely promoting life.

But we cannot put all the weight of changing the food system on farmers. We need to bring in the consumers. Food consumption is a political and ecological act. Every time I support a big supermarket, I'm promoting a certain way of farming. When I support small-scale farmers and local markets, I'm promoting resilience in my community. We need to educate consumers about where their food comes from and what it means to consume from small farmers who are cooling the planet and producing nutritious, accessible food.

At the same time, we need to educate consumers to become politically active so that they push governments at the local, regional, and national levels to support agriculture. The message has to be broader than "small farmers produce healthy, accessible food." That's important, but research shows that agriculture also shapes the entire social and ecological fabric around us.

For example, a study in southern California found that towns surrounded by small farms had less violence, less drug addiction, and fewer family problems than towns surrounded by big monoculture farms. In Brazil, researchers showed that towns in São Paulo State surrounded by small farms were five-to-ten degrees centigrade cooler than those surrounded by sugarcane plantations.

In other words, the agricultural landscape around cities is fundamental to their social, ecological, economic, and cultural stability. Agriculture can promote sustainable, resilient systems that conserve biodiversity and produce healthy food. But it also needs consumers who are in solidarity with farmers—who understand that farmers not only produce food but also provide social, ecological, and cultural services essential for community health.

Kerilyn: As we get toward the end of our conversation, I want to raise a question about the spiritual side of things. Many would agree that, for development to make meaningful progress, it will need to draw on the accumulated knowledge and wisdom of humanity in the moral domain. Miguel, your colleague, Victor Toledo, has argued there is an unrecognized link between agroecology and spirituality. What's your perspective?

Miguel: Absolutely. I agree with Victor Toledo, a good friend and colleague of mine, that within traditional cosmovisions spirituality is always linked to the concept of our Mother Earth, *La Pachamama*. I don't know what it's called in India, but, here, traditional farmers and peasants offer their seeds and their harvest to Mother Earth, asking for permission to plant and harvest.

This Mother Earth concept also permeates Indigenous communities across the Andes—in Ecuador, Peru, Bolivia, and parts of Colombia—through the idea of harmonious living, always tied to the existence of Mother Earth.

Victor Toledo talks about how farmers have a praxis and a cosmos. The cosmos—their belief system about the way they approach nature respectfully—is something that is lacking in modern science. We don't have a cosmos. If you talk about spirituality in science, they're going to kick you out as unscientific. And I see that dimension as fundamental, which needs to permeate all human beings in order to evolve to a level of consciousness that is going to allow us to understand that change is not only technical, economic, or social but also spiritual.

Spiritually engaging with nature is a fundamental path toward surviving the crisis we face. I find it very interesting that, when farmers transition to agroecology—redesigning their systems, increasing soil organic matter, diversifying crops, integrating animals, etc.—there is both a spiritual conversion as well as an ecological conversion. Their relationship with nature changes profoundly. When they share knowledge with other farmers, they always bring in that spiritual element: that we must coexist with nonhuman life, with the wind, the water, the mountains, the sun, the moon, and more. That dimension needs to enter the conversation, whether academia accepts it or not, and is increasingly permeating the ecological movement.

After forty years of teaching agroecology and now farming myself, I have many times knelt before nature because I thought I knew it all, but then nature decided that was not the way. As you engage with nature every day, you learn to get its messages and follow the natural laws. Farmers have done this for centuries. There is science, there is local knowledge, and there is intuition. I rely on all three as I farm here in the Colombian Andes. I bring my scientific knowledge, I rely on the local knowledge of the people here, but then I also use my intuition—trying to understand what nature is trying to say.

Richa: I completely agree with Professor Altieri. Most farmers working in this space bring a spiritual dimension to the conversation. For them, working with Mother Earth, Mother Nature, carries a sense of divinity and spirituality.

To add to the comparison between science and spirituality, the philosopher-farmer Bharat Bhushan Tyagi, who I mentioned earlier, once told me that science has an important but limited place in the world. Science can tell you what needs to be done—after experiments, after research—but it cannot tell you why. What is the meaning of life? What is the purpose of farming? Those are fundamental questions for any human activity, and they can only be answered through some kind of spiritual or religious connection—to other people, to the land, to the Earth. That is why both threads of thought are needed when we talk about working with the land.

At the same time, I want to add a caveat. In India, over the last twenty years, a certain kind of political exclusionism has attached itself to some spiritual narratives. For example, in the Zero Budget Natural Farming (ZBNF) movement, one principle is that only native Indian cows should be used. The idea is that the dung of only native cows is good and useful. This links back partly to historical practices of revering the cow, but it also raises questions.

Why is there no space for buffalo or sheep or goat dung in fertilizing the soil? Why should one kind of animal—or one spiritual narrative—be privileged over others? Even within spirituality,

we need to recognize the politics behind certain claims and think about inclusivity, about heterogeneous ways of connecting to the land and to each other.

There is no single path to creating a relationship with Mother Earth, with nature, or with other human beings. That relationality is fundamental—but there are many ways to build it, many ways to imagine harmony and spirituality. We should resist any attempt to impose just one.

Daniel: Thank you both for these very insightful reflections. To close, I'd like to ask a big-picture question. As our world faces crisis after crisis, there is a growing recognition that we need to rethink development in ways that are more sustainable, equitable, and just. What final insights would each of you offer into how we need to reimagine development?

Richa: To think about the future, we first need to go back to the past. When we talk about "development," it's not just economics or technology—although it's often framed that way. It's deeply political, rooted in colonial rule.

And here, it links back to what Professor Altieri said about carbon emissions and greenhouse gases: the colonizing countries have the highest emissions, and much of the wealth of the so-called First World was built on exploitation.

In the US, it's slavery and the exploitation of Native American lands and resources. In India, it was colonial rule—administered not only by the British but also by our own elite social groups. So marginalized communities suffered doubly: from the white man and from their own upper-caste brown *sahibs* (masters).

The whole idea of development carries a moral weight. People in the so-called Third World were made to see themselves as "backward." Millets, for example, were dismissed as food for animals or for oppressed castes, while aspirations shifted to something supposedly "modern." Those moral images are powerful and problematic and need to be challenged.

So, when we think about development, we need to move away from the apolitical language of growth and wealth. It requires us—not just elites in the US, but elites in India, too, our own scientists, all of us living comfortable urban lives—to challenge our arrogance. We need to rethink our relationships with nature and with the world around us.

This is why the concept of degrowth is so important. It's seen as provocative, but it forces us to confront how growth itself—this idea that growth alone will bring development and end poverty—actually hides extractive relationships. Colonial and postcolonial development has taken rural lands; destroyed ecosystems; and forced people into migration, factory work, and urban slums. Poverty is created this way, even as the narrative promises to erase it.

Degrowth is not just about producing only what we need; it's about redistribution, about imagining a socially just society. It's about changing what we count as success. In India today, we equate development with car ownership. But what if we asked instead: can everyone move around affordably and sustainably?

Why focus only on land or grain productivity? Why not measure resource productivity—how little water or energy we use to produce food? Why not count nutrition, food miles, or whether work is meaningful, not just whether it pays?

These are deeper, fundamental conversations. And I'm glad we're having them here.

Miguel: In Latin America, there are some very important authors—people who have challenged the whole concept of "development." They say development has been basically a tool of imperialism and colonialism, used to impose a model of growth according to someone else's agenda. Development of what, for what, and on whose terms?

Historically, a Western idea of development was imposed on societies that had their own ways and their own patterns of growth and agricultural engagement. That's why this debate is so important. Because, as you were saying, Richa, in international fora about agricture—when none of these institutions such as the FAO, or the IFAD [the International Fund for Agricultural Development], have historcially supported agroecology—they often corner us and ask us to "prove that agroecology works." They ask for the scientific evidence.

I answer, "What kind of evidence do you expect if you have never funded agroecological research?" Even so, we do have evidence that agroecology works. But then they want us to compare agroecology with conventional farming using their productivity indicators: kilograms per hectare.

Well, okay—but what about kilograms per hectare per centimeter of water, or per unit of energy, or per unit of biodiversity loss, or per unit of nutrition? Why not measure the real costs and benefits of agriculture? Because their indicators hide the externalities. You can produce lots of kilograms per hectare, but at what ecological, social, and economic costs? Nobody accounts for these. Society as a whole pays for the footprint of industrial agriculture.

So, in our networks in Latin America, we're very careful not to replicate that same problematic language and narrative. That's why concepts like food sovereignty are so powerful. They embrace a whole new paradigm—about self-sufficiency, farmers' autonomy, access to land, seeds, water, food, etc.

Autonomy is key. Like Richa was saying, farmers are drowning in debt. Agroecology reduces production costs by forty-fifty percent. That's where the economic viability comes from—not by selling at higher prices, but by lowering production costs and building independence from inputs and markets you can't control.

I know farmers with one or two hectares who produce everything their family eats. That's huge savings. They don't buy external inputs either—that's more savings. And the surplus? They sell it locally at fair prices. They make money, and they stay autonomous and sovereign.

That's why agroecology has been embraced by social movements. First, because it requires social organization and farmers' participation. Second, because it's culturally respectful. It doesn't erase traditional knowledge—it builds on it, optimizes it, strengthens it. Third, because it's economically viable—using local resources, avoiding costly inputs, etc. And finally, because it builds resilience to climate change. We've seen it over and over: after hurricanes in Cuba, Haiti, Puerto Rico, and elsewhere, the diversified farms withstood better and recovered faster than the monocultures. The same with drought: farmers apply organic matter to their soils, and every one percent increase in organic matter in the soil adds capacity to store 170,000 liters of water per hectare. This extends the capacity to tolerate water stress. That's resilience, right there.

So, for me, whether you call it development, autonomy, or food sovereignty, it all crystallizes at the local level. That's where the social construction of agricultural alternatives happens—through participation, consensus, local actors taking action. Our role, as outsiders, is just to support and facilitate the process by bringing relevant information, tools, or whatever is needed, so that local communities can lead the process themselves.

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